

BUTTERFIELD BOULEVARD SOUTH EXTENSION PROJECT City of Morgan Hill

Overhead vs. Underpass Alternative Comparison



November 10, 2009

Prepared by:



Mark Thomas & Company, Inc.

Introduction

The Butterfield Boulevard South Extension Project begins at the intersection of Tennant Avenue / Butterfield Boulevard and then proceeds southerly until it intersects with Monterey Road / Watsonville Road intersection. The following graphic generally depicts the alignment of the proposed roadway extension:



Approximately 2,300 feet from the Tennant Avenue intersection, the proposed roadway will cross the existing Union Pacific Railroad (UPRR) tracks (dual tracks). Currently, the roadway is planned to cross over the UPRR right of way with a new bridge overhead.

During preliminary design, the City requested that Mark Thomas & Company evaluate the pros and cons of an Overhead crossing versus an Underpass crossing. An underpass crossing would include taking the proposed roadway section under the UPRR tracks.

The following table identifies and summarizes typical comparative items between overpass and underpass alternatives.

Comparison Item	Overhead	Underpass
Visual and Noise Impacts	<ul style="list-style-type: none"> • More visible to adjacent property owners and public-at-large, increasing the need for aesthetic mitigations • Increased noise due to elevated roadway • Privacy concerns at adjacent properties • Large retaining walls and overhead structure prone to graffiti 	<ul style="list-style-type: none"> • Less visible to adjacent properties, reducing aesthetic mitigations • Lesser noise issues • Less intrusive to adjacent properties • Although smaller, retaining walls and bridge structure is more accessible to graffiti
Bridge Structures and Retaining Walls	<ul style="list-style-type: none"> • Larger roadway overhead bridge required (90' wide x 200' long) • 16' high retaining walls required (4 walls at 300' long) 	<ul style="list-style-type: none"> • Smaller railroad bridge (90' wide x 60' long) • Requires a second roadway bridge at Railroad Avenue (90' wide x 60' long) • Smaller 8' high retaining walls (4 walls at 300')
Railroad Impacts	<ul style="list-style-type: none"> • Lesser impacts to UPRR right of way 	<ul style="list-style-type: none"> • Requires much more coordination with UPRR due to railroad detour (shoofly) and staged bridge construction within railroad right of way
Utility Impacts	<ul style="list-style-type: none"> • Minor relocations of existing utilities. Utilities within railroad right of way are not affected. 	<ul style="list-style-type: none"> • Relocation of utilities within railroad right of way required including Aviation Fuel, gas lines, fiber optic communications, and electrical overhead

Comparison Item	Overhead	Underpass
Drainage	<ul style="list-style-type: none"> Minimal drainage control needed 	<ul style="list-style-type: none"> Pump station and reservoir system required with flooding risks and long term maintenance costs. Dewatering system required due to high groundwater
Right of Way	<ul style="list-style-type: none"> Right of way required for roadway and embankment slopes. 	<ul style="list-style-type: none"> Additional right of way (temporary easements) required for railroad detour (shoofly) and Railroad Avenue detour during construction
Traffic Handling	<ul style="list-style-type: none"> Minimal traffic controls required 	<ul style="list-style-type: none"> Detouring of local roadway (Railroad Avenue) required.
Project Costs	<ul style="list-style-type: none"> Total Cost = \$20.1 M 	<ul style="list-style-type: none"> Total Cost = \$26.6 M 32.3% Increase

Overhead Alternative

<u>Advantages</u> <ul style="list-style-type: none"> ✓ Lower construction cost 	<u>Disadvantages</u> <ul style="list-style-type: none"> ✓ More visual impact ✓ More noise impact ✓ Less privacy for adjacent properties ✓ Less convenient access to local roadways
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Underpass Alternative

<u>Advantages</u> <ul style="list-style-type: none"> ✓ Less visual impact than overhead ✓ Easier access through Butterfield due to shorter ramp lengths (less vertical elevation change as compared to overhead) 	<u>Disadvantages</u> <ul style="list-style-type: none"> ✓ Greater project cost ✓ More traffic handling during construction ✓ Greater impact to existing utilities ✓ More railroad coordination ✓ Potential for graffiti on abutment walls ✓ More temporary easements required ✓ Increased maintenance for pump station
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Summary Preliminary Cost Estimate

A summary of preliminary construction costs for the Overhead and Underpass Alternatives are as follows:

	<u>Overhead</u>	<u>Underpass</u>
Roadway Items	7,669,000	9,020,000
Structure Items	4,236,000	4,098,000
Railroad Items	50,000	2,160,000
Mobilization (10%)	1,196,000	1,528,000
Contingency (25%)	2,989,000	3,820,000
Construction Subtotal	16,140,000	20,626,000
Additional Right of Way	0	500,000
Utility Relocation	45,000	445,000
Capital Cost Subtotal	16,185,000	21,571,000
Design (13%)	2,099,000	2,682,000
Construction Management (10%)	1,614,000	2,063,000
Construction Staking (1.5%)	243,000	310,000
Project Soft Costs Subtotal	3,956,000	5,055,000
Grand Total	\$20,141,000	\$26,626,000

A more detailed breakdown of the cost items shown is included in the following pages. All costs should be considered preliminary at this stage of project development.

ATTACHMENT A

PRELIMINARY COST ESTIMATES

**Butterfield Boulevard South Extension Project, City of Morgan Hill:
Preliminary Project Cost Estimate (Butterfield Blvd/UPRR Crossing: Overhead)**

Roadway Items:	Quantity	Unit	Unit Cost	Extended	Total
Clear and Grub	16	AC	\$1,000.00	\$16,000.00	
Site Demolition (incl. tree removal)	1	LS	\$75,000.00	\$75,000.00	
Pavement Demolition	1	LS	\$15,000.00	\$15,000.00	
Roadway Grading	220,882	CY	\$8.00	\$1,767,056.00	
Imported Borrow	193,600	CY	\$12.00	\$2,323,200.00	
Detention Pond Excavation	1,900	CY	\$10.00	\$19,000.00	
Asphalt Concrete	9,481	TON	\$100.00	\$948,100.00	
Aggregate Base	17,237	TON	\$15.00	\$258,555.00	
Hydroseed	1	LS	\$8,000.00	\$8,000.00	
Minor Concrete (curb & gutter)	8,870	LF	\$22.00	\$195,140.00	
Minor Concrete (Mod A1 median curb, 7.5")	8,382	LF	\$20.00	\$167,640.00	
Minor Concrete (sidewalk)	47,258	SF	\$5.00	\$236,290.00	
Minor Concrete (median paving)	5,200	SF	\$8.00	\$41,600.00	
Plant Sycamore Trees (15 gal.)	238	EA	\$300.00	\$71,400.00	
Median Landscaping	490	CY	\$25.00	\$12,250.00	
Landscape Irrigation	1	LS	\$10,000.00	\$10,000.00	
Signal Modifications	1	LS	\$220,000.00	\$220,000.00	
Electroliers	56	EA	\$2,800.00	\$156,800.00	
12" PVC (SDR-26) Pipe	2,690	LF	\$50.00	\$134,500.00	
8" PVC (SDR-26) Pipe	236	LF	\$44.00	\$10,384.00	
Sanitary Sewer Manholes	11	EA	\$5,000.00	\$55,000.00	
Bore and Jack 12 " Sewer Main	1	LS	\$25,000.00	\$25,000.00	
12" DIP (CL-50)	4,293	LF	\$44.00	\$188,892.00	
6" DIP (CL-50)	1,280	LF	\$38.00	\$48,640.00	
Blow Off Valves	2	EA	\$900.00	\$1,800.00	
2" Landscape Water Services	2	EA	\$2,000.00	\$4,000.00	
Fire Hydrants	7	EA	\$2,700.00	\$18,900.00	
Bore and Jack 12 " Water Main	1	LS	\$25,000.00	\$25,000.00	
27" RCP	772	LF	\$70.00	\$54,040.00	
24" RCP	250	LF	\$65.00	\$16,250.00	
18" RCP	560	LF	\$58.00	\$32,480.00	
15" RCP	90	LF	\$54.00	\$4,860.00	
Curb Inlets	9	EA	\$2,500.00	\$22,500.00	
36" x 36" Drop Inlets	2	EA	\$2,000.00	\$4,000.00	
Storm Manholes	4	EA	\$5,000.00	\$20,000.00	
Rock Rip-Rap Outfalls	2	EA	\$8,000.00	\$16,000.00	
10' x 8' Double Box Culvert	1	LS	\$250,000.00	\$250,000.00	
Compacted Earth Check Dams	3	EA	\$8,000.00	\$24,000.00	
Traffic Striping & Markings (Paint)	1	LS	\$80,000.00	\$80,000.00	
Remove Striping and Pavement Markers	1	LS	\$4,000.00	\$4,000.00	
Reflective Pavement Markers	1	LS	\$4,500.00	\$4,500.00	
Roadside Sign (One Post)	30	EA	\$350.00	\$10,500.00	
Roadside Sign (Two Post)	1	LS	\$6,000.00	\$6,000.00	
Roadside Sign (Strap and Saddle Bracket)	50	EA	\$250.00	\$12,500.00	
Remove/Salvage Existing Signs	1	LS	\$1,000.00	\$1,000.00	
Monument	11	EA	\$600.00	\$6,600.00	

**Butterfield Boulevard South Extension Project, City of Morgan Hill:
Preliminary Project Cost Estimate (Butterfield Blvd/UPRR Crossing: Overhead)**

Roadway Items (Continued):	Quantity	Unit	Unit Cost	Extended	Total
Relocate Street Barricade	1	LS	\$1,500.00	\$1,500.00	
Watsonville Road Detour	1	LS	\$45,000.00	\$45,000.00	
Roadway Subtotal					\$7,669,000.00
Structure Items:	Quantity	Unit	Unit Cost	Extended	Total
Butterfield Boulevard Bridge Structure	18,000	SF	\$150.00	\$2,700,000.00	
Retaining Wall	19,200	SF	\$80.00	\$1,536,000.00	
Structure Subtotal					\$4,236,000.00
Railroad Items:	Quantity	Unit	Unit Cost	Extended	Total
Remove/Retire Existing Equipment	1	LS	\$50,000.00	\$50,000.00	
Railroad Subtotal					\$50,000.00
Mobilization	10%				\$ 1,196,000
Contingencies	25%				\$ 2,989,000
Additional Right of Way:	Quantity	Unit	Unit Cost	Extended	Total
None				\$0.00	
Additional Right of Way Subtotal					\$0.00
Utility Relocation Items:	Quantity	Unit	Unit Cost	Extended	Total
Electrical Overhead	300	LF	\$150.00	\$45,000.00	
Utility Relocation Subtotal					\$45,000.00
Capital Cost Subtotal					\$ 16,185,000
Design (13%)					\$ 2,099,000
Construction Management (10%)					\$ 1,614,000
Construction Staking (1.5%)					\$ 243,000
Grand Total					\$ 20,141,000

**Butterfield Boulevard South Extension Project, City of Morgan Hill:
Preliminary Project Cost Estimate (Butterfield Blvd/UPRR Crossing: Underpass)**

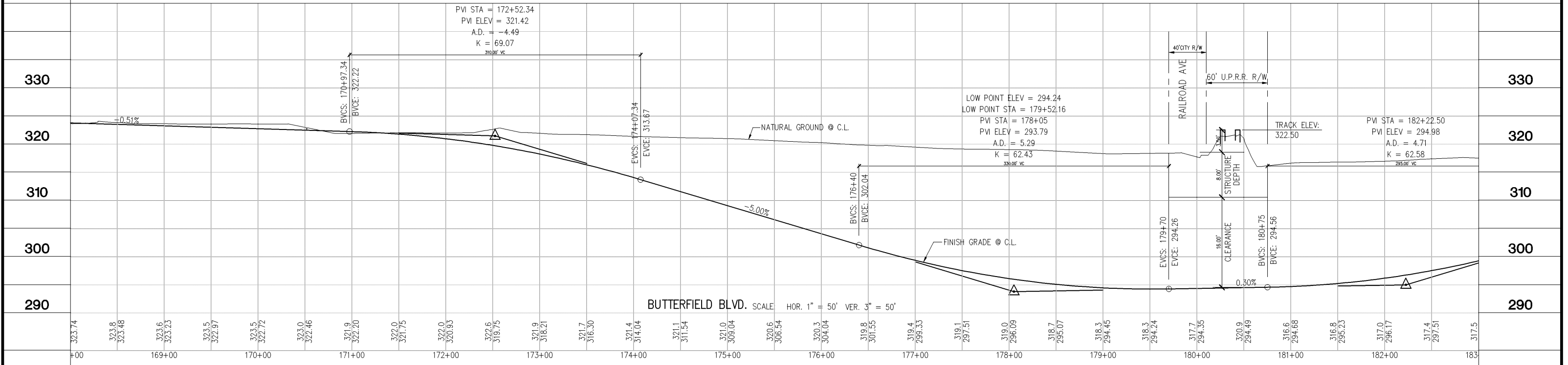
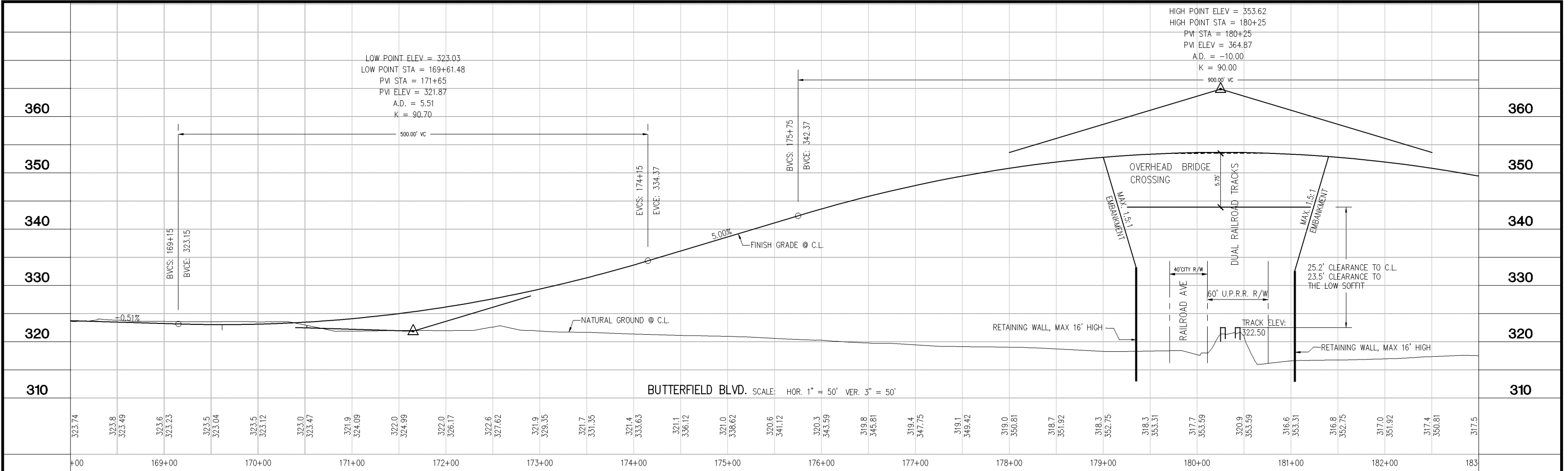
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Clear and Grub	16	AC	\$1,000.00	\$16,000.00	
Site Demolition (incl. tree removal)	1	LS	\$75,000.00	\$75,000.00	
Pavement Demolition	1	LS	\$15,000.00	\$15,000.00	
Roadway Grading	34,713	CY	\$8.00	\$277,704.00	
Roadway Excavation	120,000	CY	\$10.00	\$1,200,000.00	
Detention Pond Excavation	101,900	CY	\$10.00	\$1,019,000.00	
Off Haul	220,000	CY	\$10.00	\$2,200,000.00	
Asphalt Concrete	11,477	TON	\$100.00	\$1,147,700.00	
Aggregate Base	20,459	TON	\$15.00	\$306,885.00	
Hydroseed	1	LS	\$8,000.00	\$8,000.00	
Minor Concrete (curb & gutter)	8,870	LF	\$22.00	\$195,140.00	
Minor Concrete (Mod A1 median curb, 7.5")	8,382	LF	\$20.00	\$167,640.00	
Minor Concrete (sidewalk)	47,258	SF	\$5.00	\$236,290.00	
Minor Concrete (median paving)	5,200	SF	\$8.00	\$41,600.00	
Plant Sycamore Trees (15 gal.)	238	EA	\$300.00	\$71,400.00	
Median Landscaping	490	CY	\$25.00	\$12,250.00	
Landscape Irrigation	1	LS	\$10,000.00	\$10,000.00	
Signal Modifications	1	LS	\$220,000.00	\$220,000.00	
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6" DIP (CL-50)	1,280	LF	\$38.00	\$48,640.00	
Blow Off Valves	2	EA	\$900.00	\$1,800.00	
2" Landscape Water Services	2	EA	\$2,000.00	\$4,000.00	
Fire Hydrants	7	EA	\$2,700.00	\$18,900.00	
Bore and Jack 12 " Water Main	1	LS	\$25,000.00	\$25,000.00	
27" RCP	772	LF	\$70.00	\$54,040.00	
24" RCP	250	LF	\$65.00	\$16,250.00	
18" RCP	560	LF	\$58.00	\$32,480.00	
15" RCP	1,290	LF	\$54.00	\$69,660.00	
Pump Station	1	LS	\$450,000.00	\$450,000.00	
Curb Inlets	9	EA	\$2,500.00	\$22,500.00	
36" x 36" Drop Inlets	2	EA	\$2,000.00	\$4,000.00	
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**Butterfield Boulevard South Extension Project, City of Morgan Hill:
Preliminary Project Cost Estimate (Butterfield Blvd/UPRR Crossing: Underpass)**

Roadway Items (Continued):	Quantity	Unit	Unit Cost	Extended	Total
Remove/Salvage Existing Signs	1	LS	\$1,000.00	\$1,000.00	
Monument	11	EA	\$600.00	\$6,600.00	
Relocate Street Barricade	1	LS	\$1,500.00	\$1,500.00	
Watsonville Road Detour	1	LS	\$45,000.00	\$45,000.00	
Roadway Subtotal					\$9,020,000.00
Structure Items:	Quantity	Unit	Unit Cost	Extended	Total
UPRR Bridge Structure	5,400	SF	\$450.00	\$2,430,000.00	
Railroad Avenue Bridge Structure	3,600	SF	\$250.00	\$900,000.00	
Retaining Wall	9,600	SF	\$80.00	\$768,000.00	
Structure Subtotal					\$4,098,000.00
Railroad Items:	Quantity	Unit	Unit Cost	Extended	Total
Remove/Retire Existing Equipment	1	LS	\$50,000.00	\$50,000.00	
Shoofly	1	LS	\$2,000,000.00	\$2,000,000.00	
Asphalt Concrete (Temp Access Road)	698	TON	\$100.00	\$69,800.00	
Aggregate Base (Temp Access Road)	2,667	TON	\$15.00	\$40,005.00	
Railroad Subtotal					\$2,160,000.00
Mobilization	10%				\$ 1,528,000
Contingencies	25%				\$ 3,820,000
Additional Right of Way:	Quantity	Unit	Unit Cost	Extended	Total
Easements	1	LS	\$200,000.00	\$200,000.00	
Property Impact Mitigation	1	LS	\$50,000.00	\$50,000.00	
Property Restoration	1	LS	\$250,000.00	\$250,000.00	
Additional Right of Way Subtotal					\$ 500,000
Utility Relocation Items:	Quantity	Unit	Unit Cost	Extended	Total
Aviation Fuel Line (Temp. Trucking)	1	LS	\$125,000.00	\$125,000.00	
Aviation Fuel Line (Perm. Relocation)	1	LS	\$125,000.00	\$125,000.00	
PG&E Gas	300	LF	\$150.00	\$45,000.00	
Fiber Optic	300	LF	\$350.00	\$105,000.00	
Electrical Overhead	300	LF	\$150.00	\$45,000.00	
Utility Relocation Subtotal					\$ 445,000
				Capital Cost Subtotal	\$ 21,571,000
Design (13%)					\$ 2,682,000
Construction Management (10%)					\$ 2,063,000
Construction Staking (1.5%)					\$ 310,000
				Grand Total	\$ 26,626,000

ATTACHMENT B

PRELIMINARY PROFILES UNDERPASS AND OVERHEAD



MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying, and Planning Services

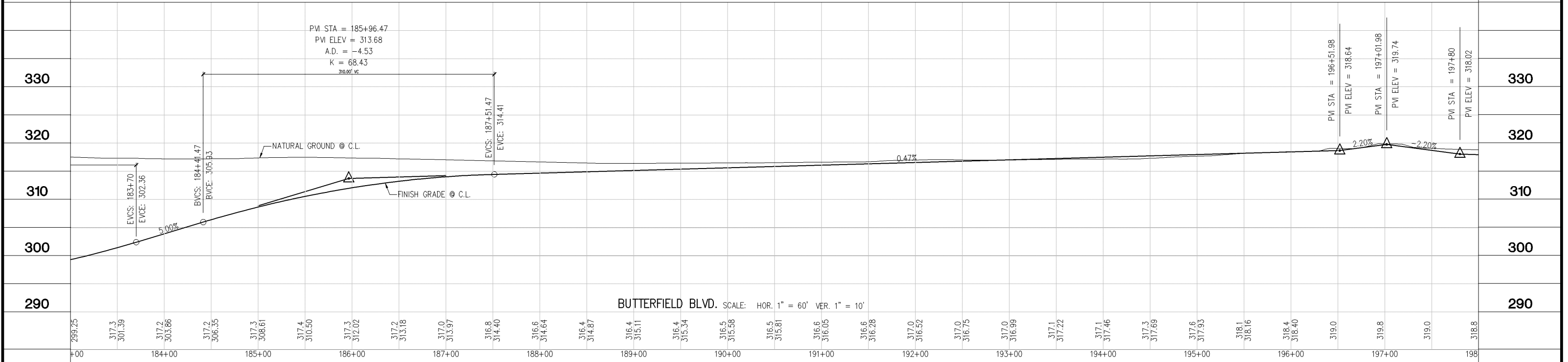
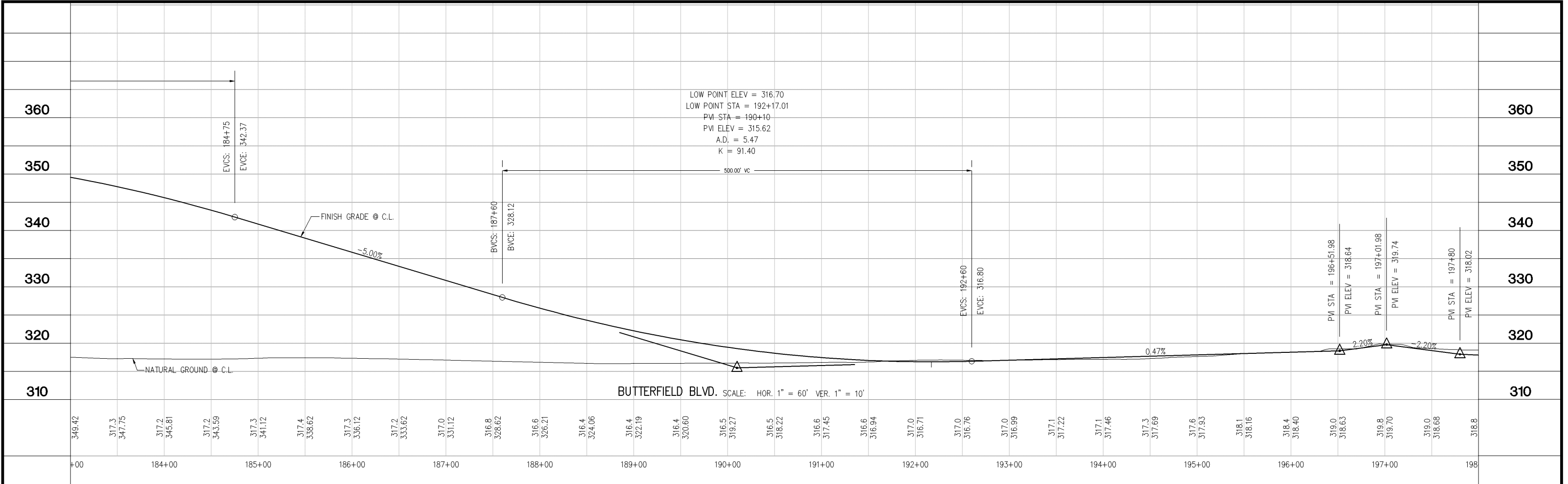
1960 ZANKER ROAD
SAN JOSE, CA 95112 (408)453-5373

DATE 11-05-09

SCALE AS SHOWN

JOB NO. SJ-09829

BUTTERFIELD Blvd. EXTENSION PROJECT
OVERHEAD vs. UNDERPASS
PROFILE EXHIBIT (SHEET 1 of 2)



MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying, and Planning Services

1960 ZANKER ROAD
SAN JOSE, CA 95112 (408)453-5373

DATE 11-05-09

SCALE AS SHOWN

JOB NO. SJ-09829

BUTTERFIELD Blvd. EXTENSION PROJECT
OVERHEAD vs. UNDERPASS
PROFILE EXHIBIT (SHEET 2 of 2)